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AUTHOR Pepitone, Emmy A.
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ABSTRACT

This investigation used social psychological concepts in analysis of social processes among pupils engaged in a cooperative task. It explored several ways of increasing interdependence among participants and determined the effects of such conditions on pupil performance. The subjects were 228 randomly selected fourth and fifth grade students. The subjects were divided into three groups. Each group was given a problem which required cooperative action for its completion. Group performance measures were obtained and related to the group's social interaction which had been recorded by observers in precoded categories. There were five experimental performance conditions: unstructured condition, task requirements, task role, group role, and a combination of task role and group role. The strongest results were sex differences. Girls responded to the role demands created in the different conditions, whereas boys did so minimally. In the unstructured performance conditions, the girls' quality of work was better than the boys'. In comparison with other conditions, however, this condition resulted in the poorest quality of performance for both groups. (Footnotes and a bibliography are included.) (BRB)

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FACILITATION OF COOPERATIVE BEHAVIOR IN ELEMENTARY SCHOOL CHILDREN

Emmy A. Pepitone

Bryn Mawr College

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FACILITATION OF COOPERATIVE BEHAVIOR IN ELEMENTARY SCHOOL CHILDREN

During the past half century, various social critics of American education have condemned schools for their relative unconcern with satisfaction of individual learners' personal needs. Others have been equally vocal in complaining about the schools' allegedly excessive emphasis on the individual. Still others opined that training for independence and individuality is sacrificed to classroom demands for conformity. And, there are also demands on schools to train its pupils in skills needed in a participatory democracy.

It stands to reason that, in order to function adequately in a society as complex as ours, individuals need to receive training for both independence and interdependence. Anecdotal reports of classroom atmospheres suggest that, by and large, they mirror our national individualistic ethos (Henry, 1957; Jackson, 1968; Bronfenbrenner, 1970). Training for interdependence is conspicuously absent in most schools and research in this area is similarly sparse and sporadic. Even though there is a substantial body of literature on group processes, it is seldom applied to the analysis of pupil performance. A recent review accounts for this state of affairs in a trenchant analysis of relationships between the field of Social Psychology and Education (Charters, 1973). The present investigation uses social psychological concepts in analysis of social processes among pupils engaged in a cooperative task. It explored several ways of increasing interdependence among participants. Secondly, it determined the effects of such conditions on pupil performance.

Social psychological research in the area of cooperation has been greatly influenced by the conceptualization of Morton Deutsch (1949). His theoretical analysis focuses on individual goal-relationships: mutually exclusive in competition, shared in cooperation. Most subsequent research has been concerned with determining goodness of performance under these two contrasting goal-structures, perhaps at the expense of neglecting some of the important problems inherent in competition as well as cooperation. Our program of research is based on the assumption that theoretical and experimental juxtaposition of cooperation and competition obscures important questions that should be asked about each process separately (Pepitone, 1969). Our first series of studies focused on conditions that stimulated competitive behaviors among elementary school children (Pepitone, 1972). The present study creates experimentally several conditions assumed to facilitate occurrence of cooperative behaviors.

The Deutsch conceptualization may be taken to imply that mere provision of a work-situation in which shared aims are likely to exist will produce cooperative group interaction toward the shared goals. In fact, employment of the "project method" in educational settings may rest on precisely such a belief in goal-commonality as a sufficient condition for cooperation. An early exploratory study of elementary school children (Stendler, Damrin, Haines, 1951) casts doubt on such an assumption: given a common goal with the task to paint a mural, some pupils withdrew, others only helped best friends, while still others did the lions share of the work for the group, but worked by themselves. A recent study in our program demonstrated that, even in a work-situation where a strong group goal

exists, third graders will compete with each other, depending on the similarity of their task-assignments (Hannah, 1970).

Current research is beginning to concern itself with more precise analysis of variables within either competitive or cooperative or cooperative goal structure situations. It is noteworthy that most of these investigations approach their problem by considering the task-structures involved. For instance, competitive motivation is examined as a function of complexity of task (Gifford, 1972). In cooperative conditions, such task-analysis poses additional problems which stem from the group processes which occur when several individuals are working on a common task. A recent review categorizes cooperative tasks into those that require as outcomes a common product vs. those that allow for cooperative interaction but demand individual final products. (Thompson, 1972). Only a few investigations could be located in which it was possible to categorize tasks in this manner, and these were field studies in relatively uncontrolled educational settings. They proved inconclusive, partly because as Thompson points out, no records were kept of the extent to which pupil interaction actually took place. Still another series of studies employed tasks that could be manipulated to favor either cooperative or competitive goal-structures among two participants, but concern here centered on existence of cooperative or competitive motivation as inferred from a single act of string-pulling (Madsen, 1971). Again, no data were obtained on social processes involved. The most relevant information about social interaction may still be found in the early studies which contrast cooperation and competition; they generally conclude that interaction under cooperative goal-structures is more friendly,

while under competitive goal-structures interpersonal hostilities are more frequent (e.g. Deutsch, 1949; Hammond and Goldman, 1961).

The research reviewed above suggests that progress in understanding relationships between cooperation and performance would lie in the direction of more detailed examination of member interaction during work on specific tasks. The unique aspect about cooperation would seem to be the fact that members must engage in interactions with each other, and probably of specific work-related kinds. Conceptually, this is to say that what defines cooperative situations is the particular interdependencies among members. Deutsch has emphasized member-interdependence which stems from a goal-structure which is shared by, or held in common with, other members of a group. Our analysis selects the work-task itself as a second source of interdependence of members. The more interdependent group members are made through a task, the more frequent must be their interaction, and, provided ability is present, we would hypothesize, the better their common product.

How can such work-interdependence be characterized? Presumably, different tasks demand different degrees and kinds of member interaction. We may thus speak of member interdependence created by task-requiredness. In trying to categorize member behavior which can be related to task-requiredness, it is useful to turn to theories concerned with interpersonal behavior in small group settings. There, a meaningful distinction is made between member behavior which is related to the <u>work</u> of the group-task-roles and those behaviors having to do with the <u>process</u> of working together -- group roles (Heincke and Bales, 1953).

Almost by definition, every work group may be said to require execution of some group-roles; one might speculate that cooperation perhaps involves special types of group processes -- for instance, integration of member activities or opinions, helping relations of all kinds, etc. Task-role requirements would seem to be more specifically a function of the nature of a particular task. Here, another distinction might turn out to be important: task-requirements which can be carried out by any one member of the group, and those which must be carried out by specific members. The latter condition is often referred to as role-specialization.

Before attempting further theoretical systematization of these relationships, the present exploratory study was undertaken. In addition to creating experimentally interdependence relations in terms of shared goals, interdependencies were also studied by creating the following variety of variables: task-requirements assigned to the group without specialization; the same task-requirements distributed in the group so that each member was assigned one specific task-role; group-roles required of the group as a whole, and a combination of task-roles and group-roles. It was assumed that these interdependencies would be reflected in the nature of the group interaction and quality of the group product. In a control condition, where interdependence was created only via a common goal, least interaction and poorest performance were expected. The greatest amount of interdependence presumably existed in the condition which featured both task-roles and group-roles; it was here that expectations were for the greatest amount of interaction, for interaction patterns which revealed more common work and helping behavior, as well as for best quality of work.

EXPERIMENTAL PROCEDURES AND DESIGN

Procedures and Design

In all major respects, the experimental procedures were identical with those used in our previous studies: groups of three fourth-or fifth-graders were selected at random from a given classroom, taken one group at a time to an unused classroom in the school, and asked to work together on a problem which requires cooperative action for its completion. Group performance measures were obtained and related to the group's social interaction which had been recorded by an observer-pair in pre-coded categories.

Subjects

The sample of 228 Ss was made up of predominantly middle and upper-middle class, white, fourth-and-fifth grade boys and girls from four elementary schools within one suburban school district. Since there were no systematic differences in pupil performance and behavior as a function of school or classroom treatment, data from all schools were combined. Since our previous investigations showed significant sex differences in behavior relevant to the present study, groups were composed of like-sexed Ss and treated separately in the data analysis.

The Work-Situation

The Work-Task consisted of two parts:

a. The Pep Board - a custom-made fourty inch circle of 1/2 inch Duraply, covered with a velvety material, on which a black line indicated separations into pie-shaped thirds:

b. Pattern-blocks from Elementary Science Study Program produced by McGraw Hill & Company. These are 250 variously shaped and colored flat blocks adapted by us so that each piece can adhere firmly to the board, yet is easily removable and placed into different positions.

Each group of three children was brought from the classroom into the experimental room. After the initial instructions were given, Ss assembled around the Pep board where the materials were demonstrated. This was followed by differential instructions given to create the experimental conditions.

The children were allowed to move about freely, to converse with each other, in short to interact with each other without any restriction in order to remove the restraints which usually exist in the classroom against displaying other-oriented behaviors. Ss were allowed fifteen minutes maximally to work on their task.

The completed pattern was then photographed with a Polaroid camera and immediately shown to the children. This served as a reward for the Ss who were praised for their performance and then dismissed. More importantly, this photograph allowed calculation of the group's productivity.

The Measurement of Productivity

Blind ratings were made by two independent judges who scored the quality of the group product along several predetermined dimensions. Each separate subscore was based on one specific task-requirement which had been detailed to the Ss in the procedural instructions. Specific ratings were made along the following dimensions: elaborateness of design; distinctness of theme; commonality of theme;

unification of pattern; balance of pattern, carefulness of execution. The sum of these ratings constituted the overall qualitative index. Agreement among the two raters for each subscore averaged 86%; these differences deviated no more than two points for a given rating and were adjusted by mutual agreement. The range of the total qualitative score could vary from 0 to a maximum of 24. The quantity of work was determined by counting the number of pieces used in the total pattern, 250 being the maximum score possible.

Behavior Observations

A record of the group's work-pattern was kept by the two observers in terms of each S's interrelationship with each of the other two Ss. This was recorded in two mutually exclusive categories: "works for self" and "works for others". The former category was checked whenever S worked by himself with no regard for the work of the other two Ss. By contract, "Works for others" was scored whenever S either worked with another S on the same pattern-part, or worked by himself but did so with his partner's advice and/or consent in order to contribute to the overall pattern. Additionally, the interaction observer recorded the group process into 28 precoded categories. Reliability, determined by Pearson correlations between different observers in previous studies, ranged for the same categories from .79 to .93.

The single categories could be grouped into three major types of behavior: Evaluative behaviors included evaluations of self, others, or of aspects of the product. Negative social behaviors consisted of such behavior as hindering, expressing aggression, ignoring, refusing to help or rejecting help when offered, etc.

Positive social behaviors focused especially on interpersonal helping behaviors which could be either non-verbal as in the manipulation of pieces for another S, and verbal such as making suggestions or offering assistance.

The Experimental Conditions

The experimental variations were created at the beginning of the session in a brief group discussion with E. In all conditions E sat in a small circle with the three Ss, and explained the nature of the work. Ss were asked to "make a big picture together with these block pieces on the board".

The Unstructured Condition served as the basic control condition: no task-requirements were introduced. In fact, to counter possible implications that E harbored expectations in regard to Ss' performance, Ss were told explicitly that they could make anything they wanted, go about working any way they wanted. The only interdependence created was that of a common goal.

In the Task-Requirements Condition, E introduced additional information about task-requirements. The picture, she explained, needed to have some overall plan and design. Secondly, it needed to be balanced, and thirdly, it needed to be unified. Ss were engaged in conversation for five to ten minutes enlarging upon these requirements, making sure that they were understood.

In the Task-Role Condition, Ss were similarly informed about the requirements of the tasks. In addition, E explained that the group "might find it easier" if each S were responsible for one specific task-requirement, whereupon each S was assigned one of the three task-roles: The Designer, the Balancer, and the Unifier, respectively.

That is, exactly the same requirements were laid down as in the Task-Requirement Condition, only this time each of the members was made responsible for executing one of the requirements. To assure that the nature of each role was understood, each S was asked to describe his or her role-assignment to the group before proceeding to work together. If requirements were not understood E clarified confusions until each S was clearly aware of the activities involved in his/her task.

In the Group-Role Condition, task-requirements were also discussed as in the two task-conditions. But, in addition, E elicited discussion about group-process requirements. Posing questions pertaining to differences between solitary work and group work, E led the discussion to include considerations of interdependence and benefits accrueing from sharing of ideas. The prepared script questioned whether working alone or in a group might produce superior results, and brought out the point that group performance depended on interpersonal communication. Inferences were then made to behavioral proscriptions for the work-session which was about to begin, focused on listening to others as well as on contributing own ideas.

In a fifth condition, conditions III and IV were combined so that each S was given one specific task-role and a general group-role.

Groups were terminated after maximally fifteen minutes' work, the product was photographed, and each S interviewed for a few minutes about his attitude toward a variety of features of the experimental session. Attitudinal scales were presented to each S, and his ratings established with the help of E or the observer.

A summary of the salient characteristics of the five conditions, and of the number of boys' and girls' groups assigned to each condition, is presented in Table I.

Data Analysis

Data were treated in a two-way analysis of variance, so that effects of Sex as well as Condition could be examined for each variable.

TABLE I.

Summary Description of Five Conditions of Cooperation

Condition	Description	Groups N Boys	N Girls	
I Unstructured	Coop Work Structure, Common goal No task-requirements No differentiated task-roles No group roles	6	8	
II Task-Requirements	Coop Work Structure, Common goal Task-Requirements No differentiated task-roles No group roles	7	9	
III Task-Roles	Coop Work Structure, Common goal Task-Requirements Differentiated task-roles No group roles	7	8	
IV Group Roles	Coop Work Structure, Common goal Task-Requirements No differentiated task-roles Group roles	8	8	
V Task Roles + Group Roles	Coop Work Structure, Common goal Task-Requirements Differentiated task-roles Group roles	7	8	
	Total N Groups	35	41	76
	Total N SS	105	123	228

RESULTS

Overall Patterns of Social Interaction

In each of the five conditions, Ss spent most of the fifteen minutes work session manipulating the block pieces (the average amount of working varies from 62% to 81% of the total recorded behavior). The greatest amount of all recorded social interaction consists of Helping and Accepting Help, which combined varies from 66% to 90% across conditions. Since there was only a small amount of behavior in each of the remaining interaction categories, which did not differ significantly across conditions, these behaviors are not included in Table II. It need merely be pointed out here that negative social behaviors -- Hindering, Aggression, Rejecting, Ignoring -- were virtually absent, as was interpersonal Competition and Evaluations of all kinds. We are, then, dealing here with groups who accept the common goal, who are working in an non-evaluative, accepting climate displaying almost exclusively positive social behaviors characteristic of cooperating groups.

Comparison Among Conditions

Analysis of results concentrates on the specific character of the positive social interactions in the five conditions, and on the quality of performance as presented in Table II.

The Unstructured Condition

We may start by noting the results of the basic control condition in which Ss were given freedom to proceed in any way they wish, without imposition of any kind of required work-structure from E. The mean total behavior, as well as the mean social interaction,

TABLE II

MEAN AMOUNT OF SOCIAL INTERACTION AND PERFORMANCE
OF BOYS AND GIRLS GROUPS
IN FIVE CONDITIONS OF COOPERATION

CONDITIONS	I Unstructured		II Task Requirements		III Task Roles		IV Group Roles		V Task Roles + Group Roles		F of 1	F of 4	F of 4
SEX	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Sex	Cond.	Sex + Cond.
BEHAVIOR													
Total Behavior	44.33	47.92	50.76	48.11	49.40	49.13	49.70	56.70	45.50	52.58	4.38	2.65^{x}	1.93
Social Interaction	14.20	10.21	17.40	15.15	14.90	16.25	14.67	20.83	18.19	19.21	0.20	2.95^{x}	1.85
Work	30.10	37.70	33.30	33.00	35.24	32.88	35.13	35.88	27.38	33.38	7.44^{xx}	3.95^{xx}	5.04^{xxx}
Works for Self	6.50	22.80	4.60	11.20	16.20	9.50	17.10	9.90	3.30	5.00	1.01	3.46^{xx}	4.26^{xx}
Works for Group	23.50	14.80	28.60	20.67	18.05	22.75	17.50	25.50	23.50	27.67	0.00	1.50	2.97^{xx}
Helps	5.67	3.80	6.81	5.10	5.90	6.50	5.40	7.60	7.50	7.30	0.08	1.68	1.29
PERFORMANCE													
Quality	14.39	12.75	14.86	16.56	15.29	17.75	14.75	18.75	16.00	19.38	7.67^{xxx}	3.78^{xx}	1.90
Quantity	2.00	3.13	2.86	2.67	2.43	2.13	2.50	2.42	1.90	2.25	1.84	3.18^{x}	3.92^{xx}
Carefulness of Execution	2.83	2.50	2.14	2.67	2.57	3.00	2.63	3.38	2.95	3.25	11.10^{xx}	6.09^{xxx}	3.32^{x}
Elaborateness of Design	2.00	1.86	1.29	1.78	1.57	2.00	1.63	2.38	1.86	2.38	12.44^{xxx}	2.97^{x}	1.54

Continued

TABLE II

MEAN AMOUNT OF SOCIAL INTERACTION AND PERFORMANCE
OF BOYS AND GIRLS GROUPS
IN FIVE CONDITIONS OF COOPERATION

CONDITIONS	I Unstructured		II Task Requirements		III Task Roles		IV Group Roles		V Task Roles + Group Roles		F of 1	F of 4	F of 4
SEX	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Sex	Cond.	Sex + Cond.
Commonality of Theme	1.67	1.25	1.71	2.00	1.71	2.25	1.25	1.25	2.29	2.75	0.97	6.25^{xxx}	0.98
Overall Balance	1.33	.75	1.43	2.00	2.29	2.00	2.00	2.50	2.00	2.25	0.31	7.29^{xxx}	1.87
Unification	.33	.25	1.29	1.22	.86	2.00	1.00	2.25	1.57	2.00	9.31^{xx}	8.94^{xxx}	2.65^{x}

LEVELS OF SIGNIFICANCE:

X ---- $p < .05$

XX ---- $p < .01$

XXX ---- $p < .001$

for both boys and girls, is lower than in any of the other conditions. Most of the time is spent manipulating pieces; this is true especially for the girls whose work-mean of 37.7 represents over 80% of their total behavior. The girls' work-activity is reflected in their quantitative productivity index which is significantly higher than in any of the other conditions; it is all the more important to note that the mean qualitative index is lowest in this condition, again significantly so for the girls. Even though there is a common goal, under such relatively unstructured conditions there is less impetus toward social interaction, and the quality of work is poor.

Significant sex-differences appear when the working patterns are examined in greater detail: while girls do significantly more work than boys (means = 37.5 vs. 30.1, $p < .005$) their work is more solitary and they help each other very little. (Mean Boys Works for Self 16.5 vs. Girls 22.8, $p < .01$). In fact, there is a strong tendency for the boys to work together more, and to help each other more than do the girls (Mean Helps, boys 5.67 vs. girls 3.80). Performance is entirely consistent with these work-patterns: on the average, the girls place significantly more block pieces on the board than do the boys, (Mean quantitative index for girls 3.13 vs. 2.00), but the boys outscore the girls on every productivity subscore and on the total qualitative index in this condition.

These trends suggest that, if left alone in this kind of unstructured condition, boys have greater skills in working together with this type of task.

The Task-Requiredness Condition

Demands that work be performed in certain specific ways make both boys and girls abandon considerably their individual working patterns. There is a significant increase in their working together toward their respective goals when they are asked to make a unified and balanced design:

(Girls' Mean Works together, Condition I 14.8 vs. Condition II 20.6

Boys' Mean Works together, Condition I 23.5 vs. Condition II 28.6)

It may be recalled that task-requirements were specifically intended to increase interdependence. That is, Ss would have to work together to fulfill the demands growing out of the task. This is indeed what happened.

For the girls, there is a sizeable increase in the average quality of work. Significantly, this qualitative improvement in Condition II occurs primarily in the characteristics of the product which were stated requirements in this condition: balance, unification, and commonality of theme. (Overall quality of mean product, Condition II, 16.56 vs. 12.75 in Condition I, $p < .02$).

For the boys, the overall quality of productivity is unaffected; they too respond somewhat to the task-requirements by improving the balance and unification of their design. In contrast with the girls, however, the boys' elaborateness of design is poorer and care in execution suffers also. One might infer that while the boys accepted the work-requirements, such a structure was actually restricting to them, in some respects, whereas it proved helpful to the girls.

The Role-Structure Conditions

Results from the three role-conditions are examined together, because they demonstrate consistent trends. Again, strong sex differences are evident.

As the role-demands for increased interdependence increase in the different conditions, so do girls systematically respond by greater absolute amounts of interaction with each other, increased group-oriented behavior, greater helpfulness, and a systematic, significant increase in mean quality of performance (Note, for example, the following trend across conditions for girls:

Working for Group, Means across Conditions:

14.8; 20.67; 22.75; 25.50; 27.67

Quality of Performance, Means:

12.75; 16.57; 17.75; 18.75; 19.38)

The improvement in quality of performance may also be seen in corresponding increases in the subscores of the productivity index which reflect response to task-requirements. We may conclude that the girls accept the role-inductions of the Experimenter, and are helped by them to improved performance. It should be noted, here, however, that the task-role specialization required in Condition III as contrasted with Condition II where only task-requirements were specified, results in insignificant changes in interaction-pattern and performance, even though the trends are in the predicted direction.

In Condition IV, where interdependence is created on the group process level by requiring girls to pay attention to each other, their social interaction is indeed maximal, and helpfulness is greatest. This increased sociability is presumably held in check by

knowledge of task-requirements also present in this condition, so that the quality of work is not affected detrimentally. It is suggestive, though, that in this condition Commonality of theme is lowest both for boys and for girls; perhaps the group-roles resulted in greater acceptance of diversity of ideas, thus reducing the commonality score.

In Condition V, where the greatest interdependence was created via task-roles as well as group roles, practically no self-oriented work occurs: the girls work almost exclusively together for the common goal (Condition V, girls mean Works for self 5.0 vs. mean works for group, 27.67) The mean quality of performance for the girls in this condition, 19.38, approaches the maximum possible score of 24.

Boys, over the three role-structure conditions, follow a more-or-less invariable pattern of behavior: they are relatively unresponsive to induction of behavioral role-demands, their performance does not change significantly either when required to assume task-roles, or to assume group roles. In fact, in Condition III and IV there is a trend toward solitary work: mean Works for Self increases from 4.6 in Condition II to 16.2 in Condition III and 17.10 in Condition IV). This finding suggests that boys interpret role-demands by assuming greater individual responsibility. Only when the constellation of role-demands becomes massive -- in Condition V -- do they respond by increase in relevant social behaviors and improved quality of performance. Thus, in the last condition, they become more similar to the girls and more similar to themselves as they functioned in the Unstructured Condition.

DISCUSSION AND CONCLUSIONS

We have attempted to extend analyses of cooperation which focus on goal-interdependence to include additional sources of interdependence in groups. In the determinants of interdependence among group members one must include the "climate" of the culture in which the groups are working. More particularly, one must look for group standards in regard to competition or cooperation, or, put differently, in regard to individuals working independently or together. Consideration of this type of ideology seems particularly relevant in school settings where strong standards fostering independence are the rule. In our study, Ss were placed into a situation where social interaction was valued quite explicitly: E attempted actively to remove classroom restraints against social interactions (particularly if they involve noise, movements from assigned seats, etc.). In fact, E made a point of communicating her expectation that Ss would enjoy working together as a group. Such a positive climate seems a pre-condition for cooperation; its impact cannot be assessed here as it was held constant in all conditions. Repetition of this study in an atmosphere less conducive to interdependent work may very well show quite different results.

Thus, two of the most important variables known to stimulate cooperative behaviors were present in all our conditions: the combination of being placed into a climate which fostered member interaction, and placement into a group which is required to work toward a common goal. The fact that task-and-role-requirements

had sizeable effects in this study attests to their importance as additional determinants of cooperative behavior.

In our study Ss were required to perform their tasks in ways that would increase their dependence on each other: in order to achieve the required "balance", "unity" or "commonality" of design each member had to be concerned with the work of every other group member. Indeed, such task-interdependencies did increase social interaction, stimulated group-oriented work-patterns and resulted in better performance. We may conclude that task-requirements which make each group member dependent on the work of the other group member will improve performance under cooperative conditions -- provided, of course, that each member is able to perform the work as was the case with our simple task.

Specialized role-assignment of required tasks has more complex effects. When one group member is asked to be in charge of one part of the work required for completion of the total job, he carries some responsibility for the success of the group. But, unless others are actively prevented from execution of the same work, knowledge of the varied requirednesses is sufficient to create a common work-pattern, as was the case with the girls in Condition III. But, role-assignment may also be seen as a personal charge which increases individual performance, such specialization may actually reduce group interaction, as seemed to be the case with the boys groups in the same condition. Thus, role-assignment per se does not increase member interdependence.

When role-specialization is demanded, additional conditions must be created to assure interdependence among members. This can be

done by increasing task-required interdependence, or by introduction of group roles. For instance, each step in a member's performance of his assignment could be made dependent on a preceding step of another member. Such "intertwined" task-requirements within a pattern of specialized task-roles would assure the occurrence of group-oriented behaviors in cooperative conditions. But the same end can be also achieved by different means. Group-process roles may perform the same function of heightening interdependence even where role-specialization threatens to prevent a common work-pattern. For, presence of group-roles, even as minimal as were created in our study, orients group members toward each other so that task-required activities may take place. More complexly developed group-roles consist of skills which permit utilization, coordination and integration of the work of different group members. It is the former work-pattern which we can assume was created in Condition V, which showed maximum group-orientation and best performance for boys as well as girls. Here our study offers clear evidence that performance in cooperative conditions can be improved by the simultaneous presence of task-roles and group roles.

Sex-differences emerged as one of the most interesting, consistent and strongest findings. Briefly, they may be summarized as follows: girls responded to the role-demands created in the different conditions, whereas boys did so minimally. Secondly, when no task-requirements or role-demands were made (Condition I), boys' quality of work was better than that of girls. Corroboration of these differences can be found in several different lines of research. Hoffman has integrated these diverse studies in a theory which relates girls' task-performance to affiliative needs,

and that of boys to their orientations toward mastery of problems (Hoffman, 1972). In our Comparison Study which employed the same type of task, boys also performed better than girls, and were more confident in their ability (Pepitone, 1972). If one cares to speculate, one might attribute the boys' superior performance to a spatial factor which is allegedly more developed in boys and may be useful in our task. Or, it might be argued that boys' play school experiences include more block play in small groups which may give training for the kind of cooperative skills required with pattern blocks. Both of these propositions might lead to the conclusion that boys might react quite differently when faced with different tasks which require different skills than our task.

There is supportive evidence for the contention that the boys' relative unresponsiveness to E's demands might be a function of greater confidence in their work: in a recent study in this series (Torop, 1973), where E offered critical and/or helpful comments, boys tended to ignore her: when criticisms increased in strength, boys became more defensive than girls. Girls were more responsive to E's criticism, and able to utilize E's suggestions for improvement. Similarly, in our earlier study, girls were found to pay more attention to, and presumably were more influenced by, each others' work than were the boys. Do boys receive more independence training than girls? Might their behavior be different when faced with male experimenters, or with different kinds of role-inductions? These are questions that cannot be answered in this study.

What this study does suggest is that individual properties of learning tasks and their effects on behavior should be examined

intensively. Here one may recall that the poorest quality of work for both boys and girls occurred in the Unstructured Condition. This would seem to be an important finding, contrary to current popular Neo-Rousseau-ian notions about "creativity" presumed to be "released" under such conditions of "non-interference". The generality of our finding needs to be explored further; here we can only conclude that a relatively unstructured activity, with few task-required demands made on members of a working group, does not necessarily increase their social interaction or the quality of work.

For educational theory, our study suggests a re-evaluation of the place of cooperative work in school settings. On the one hand, there are value-questions pertaining to the aims and uses of inter-dependent work in classrooms. But aside from these, there are questions pertaining to best fit between nature of learnings and structure of the medium by which mastery is to be attained. Where is individual work most indicated, where work under cooperative conditions? And, if the latter, what is gained by leaving the work-situation unstructured, and what is lost? What task-requirements and role-specializations should be demanded? Should suggested work-patterns differ for boys and girls? And, where in the curriculum is there a place for the instruction of pupils in the necessity for, and use of, group-process roles?

Footnotes

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